

having a maximum above the point where the internal boundary intersects the lower surface of the layer. To the north of this vertical, westerly velocities increasing northward will prevail, reaching a maximum at the point where the thickness of the lighter fluid becomes zero. Within each mass of fluid there will be no variation of velocity with elevation. A graph of the velocities for a density ratio of 0.96 and an initial depth of 8 km. is given in figure 3. The unit of velocity used is a function of geographical latitude and amounts to about 280 meters per second in middle latitudes.

3. In the above system there will be a decrease of potential energy of mass distribution during the readjustment. Also, there will exist in the final state a certain amount of kinetic energy represented by the velocity distribution already described. Computation on the example already cited shows that the amount of potential energy set free is nearly three times as great as the kinetic energy represented by the circulation set up. The difference between these two quantities is accounted for by the fact that the readjustment was assumed to take place slowly on a quasistatic basis, implying the existence of an external retarding agency which absorbs a portion of the potential energy rendered available.

If the process is considered as taking place at its natural rate, the system will then arrive at the equilibrium point with a certain amount of kinetic energy of oscillation. If this additional kinetic energy is included, the sum of potential and kinetic energy for the system remains constant at all stages of the process. The character of the oscillations performed by the system cannot be determined from this analysis. However, it is probable that in the actual atmosphere density differences are generally set

up gradually, so that readjustment processes automatically proceed in an almost quasistatic manner, and energy of oscillation does not appear to a significant extent.

4. A problem comparable to the above but involving the presence of a third mass of fluid overlying the system can be treated by almost exactly the same mathematical set-up save for numerical values as was used in the first analysis, provided that the depth of the third mass is relatively large in comparison with the other two, and that the initial depths of the first two masses bear the following relation to the densities chosen:

$$\frac{D_0'}{D_0} = \frac{\rho'(\rho - \rho'')}{\rho(\rho' - \rho'')}$$

where D_0 and D_0' are the depths of the heavier and lighter fluids respectively and ρ and ρ' their densities, while ρ'' is the density of the third mass.

Taking the same value for the ratio of densities in the lower two masses and assuming a value of ρ'' equal to 0.80 ρ , and a value of 8 km. for D_0 , the result shown in figure 5 is obtained. The diagram is to be interpreted in the same manner as figure 3.

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